Discuss with your partner(s)

1. (a) How many permutations are there on the word FRITO?
   (b) How many permutations with the letters RI kept together in this order?

2. How many permutations are there on the word COFFEE?

3. Find the values of the following: (*a*) $P(6, 4)$ (*b*) $P(6, 3)$ (*c*) $P(6, 6)$

4. Each user on a computer system has a password that is six characters long, where each character is an upper case letter (A–Z) or a digit (0–9).
   If each password must contain exactly one digit, how many possible passwords are there?

5. A survey of 1000 Netflix users gives that 329 have watched *The Great British Baking Show*, 531 have watched *Demon Slayer*, and 142 have watched both.
   How many have watched either show? How many have watched neither?

6. Let A and B be sets where $|A| = 5$ and $|B| = 7$.

   (a) How many functions are there from A to B?

   (b) How many functions are there from B to A?

   (c) How many one-one functions are there from A to B?

7. A *derangement* of the set $\{1, 2, \ldots, n\}$ is a permutation where no number appears in its original position. e.g. 21 is the only derangement of $\{1, 2\}$.

   (a) List 3 derangements of $\{1, 2, 3, 4\}$

   (b) List 3 permutations of $\{1, 2, 3, 4\}$ that are not derangements

   (c) Let d_n denote the number of derangements of $\{1, 2, \ldots, n\}$. Find d_1, d_2, d_3, and d_4

   (d) Verify $d_n = (n-1)(d_{n-2} + d_{n-1})$ for $n = 3, 4$
       Can you see why this formula holds in general?